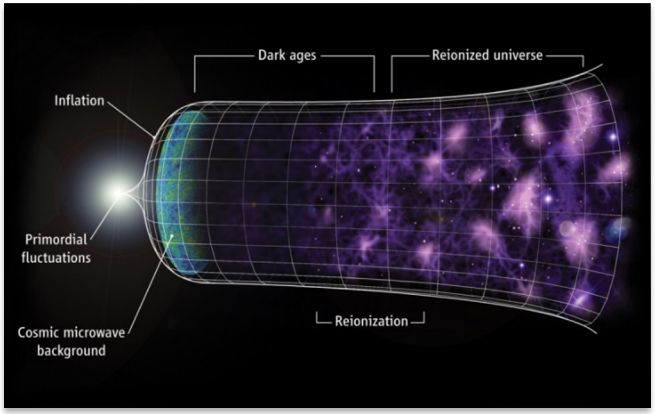
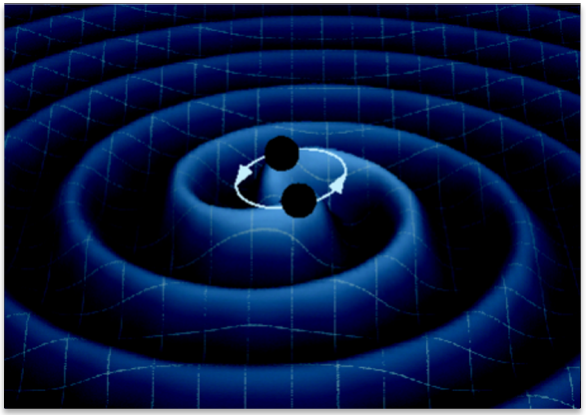
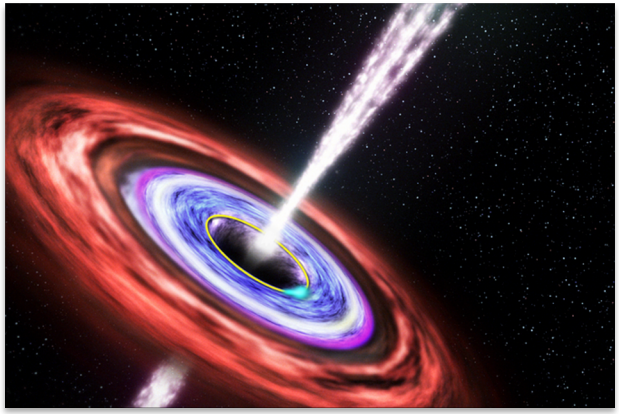
Physics of the Cosmos Program Analysis Group Report







Graça Rocha

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Advisory Committee, APAC, Meeting, 19th October 2020

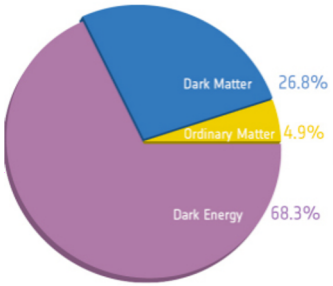
Outline

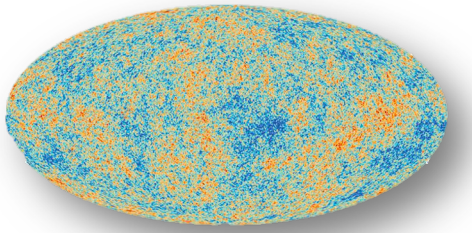
- Introduction to PhysPAG (reminder)
- PhysPAG EC Activities and Goals
- SIG Highlights, Activities and Goals

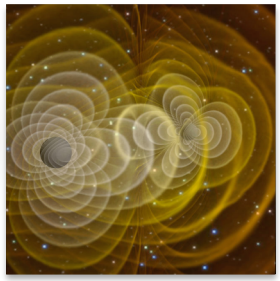
Outline

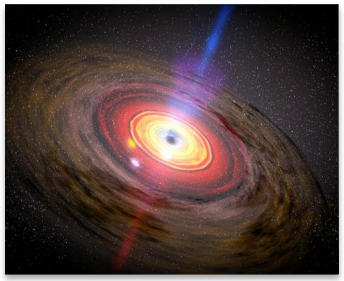
- **Introduction to PhysPAG (reminder)**
- **PhysPAG EC Activities and Goals**
- **SIG Highlights, Activities and Goals**

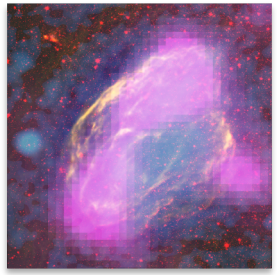
Physics of the Cosmos Science Objectives





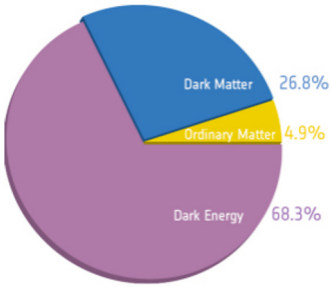


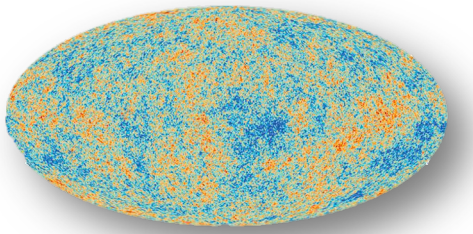


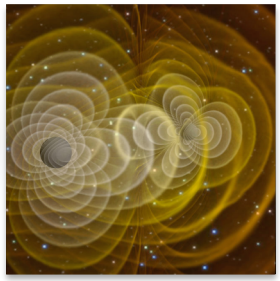


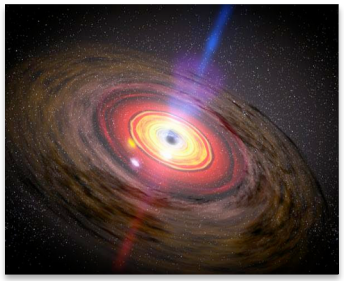
- **Increase our knowledge of dark energy**
- **Precisely measure cosmological parameters governing evolution of the universe and test inflation hypothesis of Big Bang**
- **Test validity of Einstein's General Theory of Relativity and investigate nature of spacetime**
- **Understand formation and growth of massive black holes and their role in evolution of galaxies**
- **Explore behavior of matter and energy in its most extreme environments**

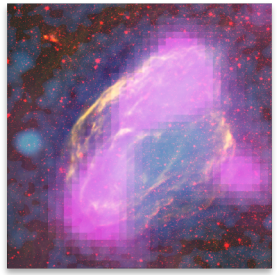
Physics of the Cosmos Program Analysis Group











❑ Six Science Interest Groups (SIGs)

- Cosmic Ray (CR SIG)
- Cosmic Structure (CoS SIG)
- Gamma Ray (GR SIG)
- Gravitational Wave (GW SIG)
- Inflation Probe (IP SIG)
- X-ray (XR SIG)

Want go get involved?
Go to:
https://pcos.gsfc.nasa.gov/physpag/sigs-sags.php
and subscribe to the relevant SIG emailing list

Annual call is out !

PhysPAG EC Membership

Name	Affiliation	Area of Expertise	Term Ends
John Conklin (Chair Emeritus)	Univ. of Florida	GW SIG	Dec 2020
Graça Rocha (Chair)	JPL/Caltech	IP SIG/CoS SIG	Dec 2020
Sylvain Guiriec	George Washington Univ.	GR SIG	Dec 2020
Kevin Huffenberger	Florida State Univ.	CoS SIG/IP SIG	Dec 2020
James Rhoads	GSFC	CoS SIG	Dec 2020
Abigail Vieregg	Univ. of Chicago	IP SIG / CR SIG	Dec 2020
Nicolas Yunes	Montana State Univ.	GW SIG	Dec 2020
Ryan Hickox (Vice Chair)	Dartmouth College	XR SIG	Dec 2021
Marcos Santander	Univ. of Alabama	CR SIG / GR SIG	Dec 2021
Jillian Bellovary	Queensborough Comm Coll.	GW SIG / XR SIG	Dec 2022
Sean McWilliams	WVU	GW SIG	Dec 2022
Bindu Rani	SURA, GSFC	GR SIG	Dec 2022
Grant Tremblay	SAO	XR SIG	Dec 2022

*New Roles

*New members as of January 2020

Outline

- Introduction to PhysPAG (reminder)
- PhysPAG EC Activities and Goals
- SIG Highlights, Activities and Goals

PhysPAG EC activities

- **Monthly Telecons** to discuss goals and plans of action such as:
  - Addressing suggestions from APAC meeting March 2020
    - Cross-PAG activities and coordination
  - Improve access for (researchers at) under-served institutions
  - Assess Usability/Accessibility of data analysis tools and data representation

These discussions have been impacted by the current crisis

PhysPAG EC activities - Cross-PAG activities

❑ Discuss suggestions from APAC meeting March 2020

More formal organization for the entire day before the first day of the winter AAS meeting, including cross-PAG activities and technology development.

- PhysPAG chair contacted COPAG, EXOPAG chairs and the PCOS, COR, and ExEP Program and Chief Scientists to express the willingness to coordinate sessions and technology development at the winter AAS meeting
- After a few exchanges of emails GR organized a Webex meeting to discuss and plan this cross-PAG coordination
- The cross-PAG coordination meeting took place on 11th of Sept.

PhysPAG EC activities - Cross-PAG activities

- Cross-PAG coordination telecon – we converged to three cross-PAG activities:

1. **Cross-cutting Technology**
   - Joint Technology Session at winter AAS meeting with emphasis on technology development that could be cross-cutting

2. **Data analysis frameworks and transferability**

3. **NASA Science at Under-Served Institutions**
   - Engagement in NASA astrophysics research from under-represented groups

Cross-PAG activities
1. Cross-cutting Technology

1. **Joint Technology Session with emphasis on Technology development that could be cross-cutting**

- Preferred format: A discussion panel - integrated after the Joint-PAG session on Friday 8th Jan, 2020, and in coordination with the three program offices. Format: four-hour block on Friday 8 January, with Paul Hertz for the Joint-PAG session, first 1.5 hours and Joint Cross-Cutting Technology session for the second 1.5 hours.
- Discussion around the question **"How can we create a whole greater than the sum of the parts by exploring synergies in technology development across the Astrophysics Division?"**
- Include communication of needs and technology progress; discussion on the technology gaps in different PAGs (based on the biennial report); discussion of whether it would be useful for technology developers to include a number of different fields in their projects / SAT proposals, for example.

Cross-PAG activities
1. Cross-cutting Technology

Saturday, 8th of January – a 4 hour block

Joint –PAG session (1.5 hours)
Cross-PAG session on Technology development that could be cross-cutting – Discussion Panel (1.5 hours)

- **Current activities carried out by the PAG chairs**

  (Rocha, Meixner and Meyer):

  - Contacting coordinators, Thai Pham for PCOS & COR and Nick Siegler for ExEP; as well as Sarah Tuttle the chair of the technology interest group (TIG) on the COPAG and John Conklin the PhysPAG chair Emeritus
  - Start assembling/inviting panel members

Cross-PAG activities
2. Data Analysis frameworks

2. Data analysis frameworks and transferability

- Consensus that a one-hour session may be limited in utility while the creation of a SAG could be useful

- Possibility of a new Cross-PAG SAG on Data Analysis Frameworks

- However, we would like to learn more about the ongoing NASA's Data Science effort.

Cross-PAG activities
2. Data Analysis frameworks

- **Current activities carried out by the PAG chairs**

  (Rocha, Meixner and Meyer):

  - Contact the current POC for the Data Science efforts at NASA HQ Patricia Knezek (Jeffrey Hayes, on leave for an year)

  - Assess the usefulness or relevance of a new cross-PAG SAG on data analysis frameworks for the data science efforts at NASA HQ
    - Is there a specific analysis the PAGs could do that would be useful to NASA HQ and so help motivate a SAG?

Cross-PAG activities
3. Nasa Science for Under-Served Groups

3. NASA Science for Under-Served Groups

- A *Cross-PAG initiative* including EC members from PhysPAG, ExoPAG, and COPAG has been convened to address issues of **equity and inclusion in NASA astrophysics research** with a focus on groups that have been previously under-represented.

- This group has so far engaged in two productive telecons in the past month with plans for more meetings.

- Lead: Ryan Hickox, Team: Natasha Batalha, Jillian Bellovary, Janice Lee, Michael Meyer, Graça Rocha, Kim Weaver, Zaven Arzoumanian (with more contributions welcome)

Cross-PAG activities
3. Nasa Science for Under-Served Groups

3. NASA Science for Under-Served Groups

Motivation:

- Among PIs *proposing* for grants, Black, Indigenous and People of Color (BIPOC) scientists are under-represented relative to the full STEM workforce (https://www.nsf.gov/nsb/publications/2020/nsb202013.pdf)

- Female PIs are under-represented on major projects (e.g., Explorer missions: https://arxiv.org/pdf/1909.10314.pdf)

- To understand and learn what challenges colleagues at traditionally under-served institutions (including some Minority Serving Institutions) face to engage in research; and to understand the impact of current NASA programs/opportunities such as MUREP and MIRO

Cross-PAG activities
3. Nasa Science for Under-Served Groups

3. NASA Science at Under-Resourced Institutions

Plan:

This Cross-PAG initiative aims to **analyze barriers to participation**, via for example through a survey of colleagues in consultation with experts in survey design and analysis.

We anticipate that this group will **prepare a charter for a SAG** in the coming months, and aims to include broad community involvement.

We will have a Cross-PAG session on 'Enhancing participation of Minority Serving Institutions, MSIs, in NASA Space Science' at the AAS meeting on Monday, 11th of January, 6:50 pm ET.

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Science Interest Group highlights

- **All SIGs will have splinter sessions at the winter AAS meeting, Jan 2021**

NASA PCOS PhysPAG	Monday	12:00	1:30
NASA Gravitational Wave SIG	Thursday	12	1:30
NASA CR / GR / GW SIG	Tuesday	12	1:30
NASA Inflation Probe SIG	Wednesday	12	1:30
NASA X-Ray SIG	Wednesday	6:50	8:20
Enhancing Participation of Minority Serving Institutions in NASA Space Science	Monday	6:50	8:20
NASA Cosmic Structure SIG	Thursday	4:10	5:40

Science Interest Group highlights

- **All SIGs will have splinter sessions at the winter AAS meeting**

PCOS PhysPAG	NASA's Physics of the Cosmos (PCOS) program covers science from gravitational waves to cosmology to high energy astrophysics. [...]
GW SIG	Status, future plans, highlights, and concerns of the Gravitational Wave Science Interest Group
CR / GR / GW SIGs (w MMA theme)	A session on the status of MultiMessenger astrophysics (MMA) from the point of view of the Gamma-ray, Cosmic Ray and Gravitational wave Science Interest Groups.
IP SIG	The IPSIG session will present topics related to the Inflation Probe study PICO, complementarity of space- and ground-based observations, and new data analysis tools and software development.
XR SIG	Status, future plans, highlights, and concerns of the X-Ray Science Interest Group
Cross-PAG session: NASA Science at Under-Resourced Institutions	Enhancing participation of Minority Serving Institutions, MSIs, in NASA Space Science

PhysPAG/SIG Meetings and Activities

- **AAS Winter January 2021**
  - PCOS & PhysPAG Town Hall
  - SIGS splinter sessions – All SIGs

- **APS April 2021**
  - PCOS & PhysPAG Town Hall
  - SIGS splinter sessions - GW SIG, CoS SIG, GR SIG, CR SIG, IP SIG